

## **Belt Line Problem**

### **Instructor's Copy**

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<sup>1</sup> This exercise was developed and field tested under U. S. Bureau of Mines research contract no. H0348040. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies or recommendations of the Interior Department's Bureau of Mines or the U. S. Government.

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## Introduction

This document contains most of the materials needed to use the exercise. The main part of the document is the instructor's copy. It tells how to use the exercise, presents the objectives, the master answer sheet, the scoring key, and, discussion notes to be used following the exercise. The last part of this document is three appendices. Appendix A is the exercise problem booklet. This booklet can be duplicated locally. The booklets are reusable. One is needed for every person in the classroom. Appendix B is the answer sheet. Copies of this answer sheet must have the invisible ink answers that appear in Appendix C printed on them.<sup>2</sup> Answer sheets are consumable. One is needed for each small group of 3 to 5 persons who work the exercise.

## Exercise Summary

Read this section first. It determines if the exercise is appropriate for your classes. If you choose to use the exercise, examine the table of contents and review the remainder of this document.

Type: Invisible ink

Length: Seven questions

Skills: First aid  
Conducting a primary and secondary survey  
Diagnosing and treating a possible shoulder dislocation or fracture  
Caring for a dislocated arm to prevent further damage  
Applying a sling and a swathe  
Proper work procedures for shoveling onto a moving belt

Location: Any mine with conveyor belt haulage (surface, metal or non-metal, underground etc.)

Problem: You are a laborer. You and Doug Sanders are shoveling onto the belt. While working, Doug catches the tip of his shovel on the moving belt. Doug's arm is thrown up and back as he is spun around and flings the shovel a few feet away. Doug swears and holds his right shoulder with his left hand. His shoulder looks deformed and he says it hurts. You must decide what to do.

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<sup>2</sup> You can do this yourself if you have the proper equipment, or you may obtain copies of preprinted answer sheets from NIOSH, Pittsburgh Research Laboratory, Pittsburgh, PA phone 412-386-5901, fax 412-386-5902 or email to [minetraining@cdc.gov](mailto:minetraining@cdc.gov).

### **How To Use This Exercise**

1. Look at the performance objectives. Decide if the exercise is relevant for your mine training class.
2. Work through the exercise with the developing pen and score your responses.
3. Read the master answer sheet for the exercise. Look at all the answers.
4. Read the "Instructor's Discussion Notes" for the exercise.
5. Become thoroughly familiar with the problem so that you can present it to your class without reading it. Put the illustrations on an overhead projector so you can use these to help explain the problem.
6. When you present the exercise to the class:
  - Give each person a problem booklet, and each group of 3 to 5 an answer sheet and a developing pen.
  - Demonstrate how to select and mark answers using the developing pen.
  - Go over the instructions for doing the exercise with the whole group.
  - Explain the problem making sure everyone understands the problem situation.
  - Have the class members work the exercise.
  - When the class members finish, have them figure up their score using the instructions at the end of the exercise.
  - When everyone has finished, discuss the exercise. Let class members discuss the merits of each answer. Add your own ideas.

### Performance Objectives for Belt Line Problem

Objective number	Capability verbs)	Description of required performance and conditions under which it is to occur
1. FA <sup>3</sup>	Recall Apply	The rule that the first step of first aid intervention is evaluation
2. FA	Evaluate	A shoulder and possible upper arm injury
3. FA	Recall Apply	The rule that an apparent joint dislocation should not be replaced in the field
4. FA	Recall Select	Reasons for not replacing a dislocated joint in the field
5. FA	Recall Select	Appropriate immobilization procedures for a dislocated shoulder
6. FA	Recognize Select	Proper methods of applying a sling and swathe to a dislocated shoulder
7. MH	Recall Select	The proper method of shoveling onto a moving conveyor belt

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<sup>3</sup> Skill and knowledge domain abbreviations:  
 FA = first aid  
 MH= materials handling

### Master Answer Sheet for Belt Line Problem

Use this answer sheet to mark your selections. Rub the developing pen gently and smoothly between the brackets. Don't scrub the pen or the message may blur. Be sure to color in the entire message once you have made a selection. Otherwise you may not get the information you need.

**Question A** (Choose only ONE unless you are told to "Try again!")

1. [ Doug may need your help now. Try again! ]
2. [ This is not the first thing that should be done. Try again! ]
3. [ Doug may need help right away. Try again! ]
4. [ Correct! Do the next question. ]

**Question B** (Select as MANY as you think are correct.)

5. [ Correct! Doug points to his right shoulder joint. ]
6. [ Correct! You feel a depression at the top of his right arm and a bulge at the front. ]
7. [ Correct! Doug holds his right elbow a couple inches from his side. ]
8. [ Correct! Both pulses are present and feel equally strong. ]
9. [ Correct! He wiggles his fingers easily. ]
10. [ Doug yells and cusses when you begin to move his arm and you stop. ]

**Question C** (Choose only ONE unless you are told to "Try again!")

11. [ This could cause further injury. Try again! ]
12. [ Correct! Do the next question. ]
13. [ Doug says "It hurts bad" and asks you what you think of the idea. Try again! ]

**Question D** (Select as MANY as you think are correct.)

- 14. [ Correct! ]
- 15. [ Correct! ]
- 16. [ No. Usually the replaced joint will hurt less. ]
- 17. [ Wrong. Although some dislocations replace themselves, it is better to replace ]  
[ them early on, but only a qualified person should do so. ]

**Question E** (Select as MANY as you think are correct.)

- 18. [ Correct! This will help support his injured shoulder. ]
- 19. [ If Doug has a dislocated shoulder this will not be helpful or comfortable. ]
- 20. [ Correct! This will help support his injured shoulder. ]
- 21. [ Correct! This is to make sure that circulation has not been cut off while you ]  
[ were applying the sling. ]
- 22. [ Correct! The cravat and sling will help support Doug's injured shoulder. ]
- 23. [ This will not provide adequate support for Doug's shoulder. ]

**Question F** (Choose only ONE unless you are told to "Try again!")

- 24. [ Try again! ]
- 25. [ Try again! ]
- 26. [ Correct! Do the next question. ]
- 27. [ Try again! ]

**Question G** (Choose only ONE unless you are told to "Try again!")

- 28. [ This is not the problem. Try again! ]
- 29. [ This would not cause the accident. Try again! ]
- 30. [ This would not be a problem. Try again! ]
- 31. [ Correct! This unsafe practice often results in accidents. End of Problem. ]
- 32. [ No matter how slow, he can still safely perform this task. Try again! ]

### **Finding your score**

Number of "Correct" answers you colored in = (1) \_\_\_\_\_

17 minus number of incorrect answers you colored in = (2) \_\_\_\_\_

Add blanks one and two to get your total score = (3) \_\_\_\_\_

Highest possible score = 32

Lowest possible score = 0



## **Instructor's Discussion Notes for Belt Line Problem**

Use the information presented here and on the master answer sheet, your own ideas and experience, and that of the miners in your class to discuss the exercise after it is completed. Group discussion can strengthen knowledge and skills, correct errors, and relate the exercise content to the experiences of the miners. After they have worked the exercise, miners enjoy discussing the problem. They also frequently think of better ways to respond to a problem than those listed among the answers. The purpose of the exercise is to help miners think about and remember basic knowledge and skills they may someday need to deal with a mine emergency. The discussion following the exercise can contribute to this goal and tailor the exercise content to the needs of the group you are training.

It is helpful to show overhead transparencies of the answers on the master answer sheet during the discussion, while the miners look at their problem booklets. This allows you to lead the group through the exercise and to discuss all the answers to each question. Most of the information about why particular answers are correct or incorrect is given on the master answer sheet.

The following notes provide additional information for you to discuss with your class. Read through and think about the notes before the class. Don't read the notes to the class members. This would be boring and ineffective. Rather, incorporate the ideas you find here with your own ideas and make these points at the appropriate place in the discussion of the exercise.

**Question A** - The correct answer is 4. The description of the incident suggests that Doug may have a significant injury to his arm such as a fracture, sprain, or dislocation. He should be assessed to determine whether an injury is present and, if so, its nature and severity should be determined.

**Question B** - The correct answers are 5, 6, 7, 8, and 9. The location of Doug's pain helps to define the point of injury. A shoulder dislocation is suggested by his holding his arm away from his side and the forward displacement of the head of the humerus (upper arm bone) which the first-aider feels. Damage to the nerves and blood vessels in the area of injury may be assessed by comparing pulses on both wrists, and checking the movement of the fingers of the right hand. The first-aider should keep in mind that a fracture may also be present in the area of the joint.

**Question C** - The correct answer is 12. Field replacements of dislocations should be avoided because fractures may be present. Such fractures can only be determined by x-raying the joint. In addition, the physician who replaces Doug's dislocation will provide him with muscle relaxing and pain reducing medication before the procedure.

**Question D** - The correct answers are 14 and 15. See the Question C discussion notes. Even though a proper replacement of a dislocation will reduce pain, a field replacement should not be attempted for the reasons indicated earlier.

**Question E** - The correct answers are 18, 20, 21, and 22. Doug's suspected dislocation should be treated by applying a bulky pad to support his elbow and a sling and swathe to support his arm. After applying the sling and swathe it is a good idea to recheck the wrist pulse to see if circulation has been affected. If available, an ice pack may be applied to the joint to relieve swelling and pain.

**Question F** - The correct answer is 26. The preferred procedure for immobilization of a suspected dislocation is as follows: 1) A bulky pad is taped to the side to support the elbow. 2) The injured arm is placed in a sling composed of a triangular cravat with a 60 inch base and approximately 38 inch sides so that the hand on the side of the injury is about 4 inches above the elbow. 3) The wrist pulse is checked on the injured side. (If the pulse is absent or reduced, adjust the arm position and the sling to restore circulation.) 4) A pocket for the elbow is formed in the sling by twisting the excess material and tying it in a knot. 5) A swathe can be formed from a second cravat. This is tied around the chest and the injured arm over the sling.

**Question G** - The correct answer is 31. To prevent injuries, material should be shoveled onto a moving belt with the miner facing the direction of the belt's travel.

### **References**

Connelly, J. F. (1983, April 15). Shoulder subluxations and dislocations. Emergency, Medicine. (pp. 69-70, 75, 78-79, 83-84).

Grant, H. D., Murray, R. H., Bergeron, J. D. (1986). Emergency care (4th ed.) (pp. 221-223). Englewood Cliffs, NJ: Prentice Hall.

Nursing 85 Books. (1985). Emergencies (pp. 354-356) Springhouse, Pennsylvania: Springhouse Corp. (pp. 354-356).

Patrizzi, J. O., Tackett, M. R., (1984). Emergency nursing: A case study approach. (pp. 350-354). Bowie, MD: Robert J. Brady Co.

**Scoring Key for Belt Line Problem**

The correct answers are marked with an asterisk.<sup>4</sup>

Question	Answer Number					
A	1	2	3	4*		
B	5*	6*	7*	8*	9*	10
C	11	12*	13			
D	14*	15*	16	17		
E	18*	19	20*	21*	22*	23
F	24	25	26*	27		
G	28	29	30	31*	32	

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<sup>4</sup> This page is printed in large type so that it may be copied and used as an overhead transparency.

## **Appendix A: Problem Booklet**

Duplicate this copy of the problem booklet for use in your classes. **Booklets should be printed on only one side of the paper.** Each person in your class should have a problem booklet while they are working the exercise. The problem booklets are reusable.

You may obtain a copy of the problem booklet from NIOSH, Pittsburgh Research Laboratory, Pittsburgh, PA phone 412-386-5901, fax 412-386-5902 or email to [minetraining@cdc.gov](mailto:minetraining@cdc.gov).

## **Appendix B: Answer Sheet Blanks**

These are the answer sheet blanks. Copies of these blank answer sheets may be duplicated in the normal fashion. However, the answers that are found within the brackets must be printed on these blank answer sheets in invisible ink. These answers are found in Appendix C. If you have the capability to print invisible ink, make copies of the blank answer sheets. Make a master of the answers that appear in Appendix C. Then print the invisible ink on the blank answer sheets, being careful to make sure all pages print and that the appropriate answers line up with the appropriate blanks. The Master Answer Sheet shows all the answers in their proper places.

Most companies and trainers prefer to obtain copies of the preprinted answer sheets from NIOSH, Pittsburgh Research Laboratory, Pittsburgh, PA phone 412-386-5901, fax 412-386-5902 or email to [minetraining@cdc.gov](mailto:minetraining@cdc.gov).

The exercise is designed to be used in small groups. You will need one answer sheet for each group of 3 to 5 persons in your class. The answer sheets are consumable. You will need a new set for each class.

A developing pen is also needed by each person who marks an answer sheet. These may be obtained from the A. B. Dick Company, P.O. Box 1970, Rochester, New York 14692, phone 1-800-225-4835.

### Answer Sheet for Belt Line Problem

Use this answer sheet to mark your selections. Rub the developing pen gently and smoothly between the brackets. Don't scrub the pen or the message may blur. Be sure to color in the entire message once you have made a selection. Otherwise you may not get the information you need.

**Question A** (Choose only ONE unless you are told to "Try again!")

1. [ ]
2. [ ]
3. [ ]
4. [ ]

**Question B** (Select as MANY as you think are correct.)

5. [ ]
6. [ ]  
[ ]
7. [ ]
8. [ ]
9. [ ]
10. [ ]

**Question C** (Choose only ONE unless you are told to "Try again!")

11. [ ]
12. [ ]
13. [ ]

**Question D** (Select as MANY as you think are correct.)

14. [ ]
15. [ ]
16. [ ]
17. [ ]  
[ ]

**Question E** (Select as MANY as you think are correct.)

18. [ ]
19. [ ]
20. [ ]
21. [ ]  
[ ]
22. [ ]
23. [ ]

**Question F** (Choose only ONE unless you are told to "Try again!")

24. [ ]
25. [ ]
26. [ ]
27. [ ]

**Question G** (Choose only ONE unless you are told to "Try again!")

28. [ ]
29. [ ]
30. [ ]
31. [ ]
32. [ ]

**Finding your score**

Number of "Correct" answers you colored in = (1) \_\_\_\_\_

17 minus number of incorrect answers you colored in = (2) \_\_\_\_\_

Add blanks one and two to get your total score = (3) \_\_\_\_\_

Highest possible score = 32

Lowest possible score = 0



### **Appendix C: Invisible ink Answers**

These pages contain the answers that must be printed in the blanks of the answer sheet in Appendix B. These answers are spaced and sequenced correctly so that they exactly match up with the appropriate blanks on the answer sheet blank.

Once the answers have been printed in the answer sheet blanks, the developing pen reveals the formerly invisible printed message.

You may obtain preprinted answer sheets or you may prepare your own copies. To learn more about these options, and to determine how many answer sheets and developing pens you will need, see the introductory section of the Instructor's Copy.

Doug may need your help now. Try again!

This is not the first thing that should be done. Try again!

Doug may need help right away. Try again!

Correct! Do the next question.

Correct! Doug points to his right shoulder joint.

Correct! You feel a depression at the top of his right arm and a bulge at the front.

Correct! Doug holds his right elbow a couple inches from his side.

Correct! Both pulses are present and feel equally strong.

Correct! He wiggles his fingers easily.

Doug yells and cusses when you begin to move his arm and you stop.

This could cause further injury. Try again!

Correct! Do the next question.

Doug says "It hurts bad" and asks you what you think of the idea. Try again!

Correct!

Correct!

No. Usually the replaced joint will hurt less.

Wrong. Although some dislocations replace themselves, it is better to replace them early on, but only a qualified person should do so.

Correct! This will help support his injured shoulder.

If Doug has a dislocated shoulder this will not be helpful or comfortable.

Correct! This will help support his injured shoulder.

Correct! This is to make sure that circulation has not been cut off while you were applying the sling.

Correct! The cravat and sling will help support Doug's injured shoulder.

This will not provide adequate support for Doug's shoulder.

Try again!

Try again!

Correct! Do the next question.

Try again!

This is not the problem. Try again!

This would not cause the accident. Try again!

This would not be a problem. Try again!

Correct! This unsafe practice often results in accidents. End of Problem.

No matter how slow, he can still safely perform this task. Try again!